A case of Pott's disease of the spine eroding into the suprarenal aorta

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Spinal tuberculous osteomyelitis eroding into the aorta is an extremely rare entity. The case of an 80-year-old man with a large proximal anastomotic pseudoaneurysm above an aortobiiliac prosthesis involving the suprarenal aorta is reported. A periaortic and perigraft fluid collection was found to be contiguous with an osteolytic process of the anterior bodies of the T12 and L1 vertebrae. Staged extraanatomic axillobifemoral bypass, graft excision, and viscerorenal revascularization with superficial femoral–popliteal veins were performed. The pathologic diagnosis of spinal tuberculous osteomyelitis was made. The rare entity of Pott's disease of the spine involving the suprarenal aorta and an aortic prosthesis presented significant challenges in resection and revascularization. The use of the deep veins of the legs as large-diameter autogenous conduit facilitated visceral and renal arterial bypass in an infected field. (J Vasc Surg 1996;24:482-6.)

Tuberculosis of the spine is an ancient disease. Evidence of these infections has been found in 5000-year-old Egyptian mummies, and clinical manifestations were described by Hippocrates. Pott's disease, the commonly used eponym for spinal tuberculosis, was initially described by Percival Pott in 1779.[1] Tuberculous spinal osteomyelitis is a rare complication that involves fewer than 1% of patients who have systemic infection.[1,2] The past decade has seen a resurgence of tuberculosis in the United States, and consequently, an increase in the number of patients who have Pott's disease.[1-3] Recently, we successfully treated a patient with tuberculous spinal osteomyelitis who had a paravertebral abscess that had eroded into the suprarenal abdominal aorta and involved an infrarenal aortobiiliac Dacron prosthesis.

CASE REPORT

An 80-year-old man with a history of coronary artery disease and prostate cancer treated with pelvic radiotherapy sought medical attention at another institution with a 6-month history of lower back pain with radicular pain down both legs. The patient denied fevers, chills, or night sweats, but did relate a 30-pound weight loss over the past 6 months. Surgical history included placement of an aortobiiliac Dacron prosthesis for aneurysmal disease 5 years earlier. Plain film spinal series demonstrated bony destruction of the anterior bodies of the twelfth thoracic and first lumbar vertebrae. A magnetic resonance scan confirmed the presence of the lesions. The ring enhancement of the areas of bone destruction was consistent with active infection (Fig. 1). The scan suggested the presence of a left paravertebral retroperitoneal fluid collection, and additional radiologic images were obtained. A computed tomographic (CT) scan revealed an enhancing left psoas abscess and osteomyelitis contiguous with a 7-cm pseudoaneurysm that involved the renal arteries above the old aortic prosthesis (Fig. 2). An attempt at percutaneous CT-guided needle aspiration of the abscess was nondiagnostic.

On transfer the patient did not appear to be toxemic and appeared afebrile with normal vital signs. No palpable masses, tenderness, or bruits were found on abdominal examination. No significant scoliosis or lordosis was noted. All pulses were palpable and symmetric, with ankle-brachial indexes of 1.1 bilaterally. A neurologic examination showed no decreased motor, sensory, or deep-tendon reflex abnormalities. Laboratory examination demonstrated a leukocyte count of 8,800/mm^3 and a hematocrit level of 37.4%. The serum creatinine level was 1.0 mg/dl. A chest radiograph showed no acute cardiopulmonary abnormalities. The patient was anergic with all skin testing.

An urgent arteriogram was obtained (Fig. 3). A 7 cm × 6 cm × 7 cm intraluminally measured suprarenal proximal aneurysm was noted above a patent aortobiiliac graft. The renal artery orifices appeared to arise from the wall of the aneurysm. The celiac and superior mesenteric arteries were widely patent.

Because an infected aortic pseudoaneurysm and graft was suspected, a staged operative approach was initiated,

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Presented at the Twentieth Annual Meeting of The Southern Association for Vascular Surgery, Naples, Fla., Jan. 24-27, 1996.
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0741-5214/96/$5.00 + 0 24/4/74673

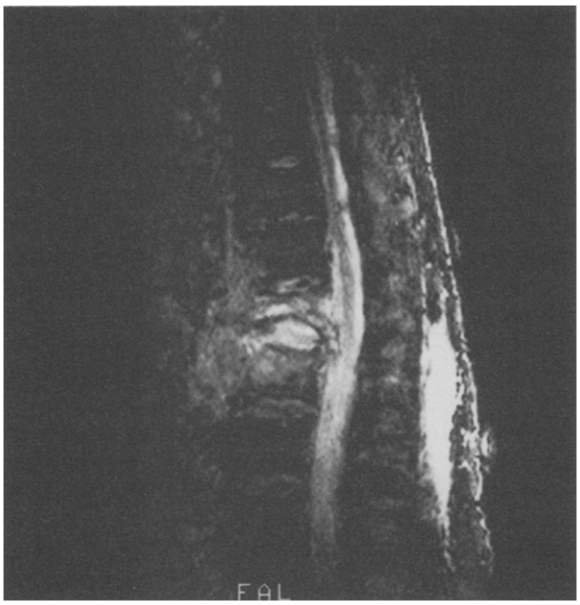

Fig. 1. MRI of T12 and L1 vertebrae shows bony destruction of anterior bodies by infectious process.

Fig. 2. CT scan at level of juxtarenal aorta shows aneurysmal change of aorta and contiguous lytic lesion of spine.

starting with the placement of a right axillofemoral, femorofemoral bypass with a 10-mm ringed expanded polytetrafluoroethylene graft. Approximately 48 hours later, the abscess and pseudoaneurysm were addressed. The patient's greater saphenous veins were of inferior quality, with varicosities and a small diameter. Consequently, the superficial femoral–popliteal veins (SFPV) from their junction with the deep femoral vein to the paragenicular popliteal space were exposed by opening Hunter's canal lateral to the sartorius muscle. The veins were harvested and prepared in anticipation of major visceral and renal revascularization.

The right SFPV was bifurcated (duplicated), and both limbs were recovered along with their proximal junction. A thoracoabdominal incision through the left ninth intercostal space was performed, and the diaphragm was radially split to the aortic hiatus. Proximal control of the descending thoracic aorta was obtained without difficulty. A medial visceral rotation was performed, and the aneurysm was exposed. Control of the common iliac graft limbs was obtained. The abscess extended from the left psoas muscle at the level of the third lumbar vertebra, cephalad to the level of the celiac trunk. The abscess cavity was filled with necrotic, caseous material, contiguous with the partially destroyed twelfth thoracic and first lumbar vertebrae, which were visible at the dorsal extent of the cavity. The abscess surrounded the false aneurysm, with the main body of the aortic prosthesis visible within the necrotic debris. The left renal artery arose from the wall of the false aneurysm, and the origin of the superior mesenteric artery appeared to be involved at the most proximal extent of the infected aorta. Because of the probability of the osteomyelitic process acting as an ongoing source of infection in the retroperitoneum, in situ prosthetic reconstruction was believed to be unwise. An end-to-side descending thoracic aortic anastomosis using the proximal segment of the bifurcated SFPV was fashioned under partial aortic occlusion. After the placement of the aortic cross-clamp below the proximal anastomosis of the vein graft just above the celiac artery and the application of iliac cross-clamps, the aneurysm was opened. Both the left renal artery and the superior mesenteric artery were revascularized with the limbs of the naturally bifurcated deep vein graft. The SFPV provided an excellent size match with the visceral arteries, with both graft limbs greater than 10 mm in diameter. Because of time constraints, the orifice of the right renal artery was oversewn. The aorta just below the celiac trunk then was oversewn with heavy monofilament suture. The aortic graft then was resected, and the distal common iliac arteries were oversewn. The abscess cavity was widely debrided, irrigated, and drained (Figs. 4 and 5).

Bacterial and fungal cultures failed to grow any pathogens. The results of fungal serologic studies were negative. Mycobacterial cultures and smears failed to demonstrate evidence of active infection; however, histologic examination of the debrided necrotic material and osteomyelitic bone showed evidence of chronic caseating granulomatous inflammation consistent with a mycobacterial infection. On the basis of presentation, the pathologic findings, and consultation with an infectious disease specialist, it was believed that the patient had tuberculous spinal osteomyelitis. Three-drug antituberculous chemotherapy with isoniazid, rifampin, and ethambutol was initiated and planned for 10 months' duration.

The patient made an uneventful recovery with no change in serum creatinine level. An aortogram was obtained before discharge (Fig. 6). The descending aorto–su-

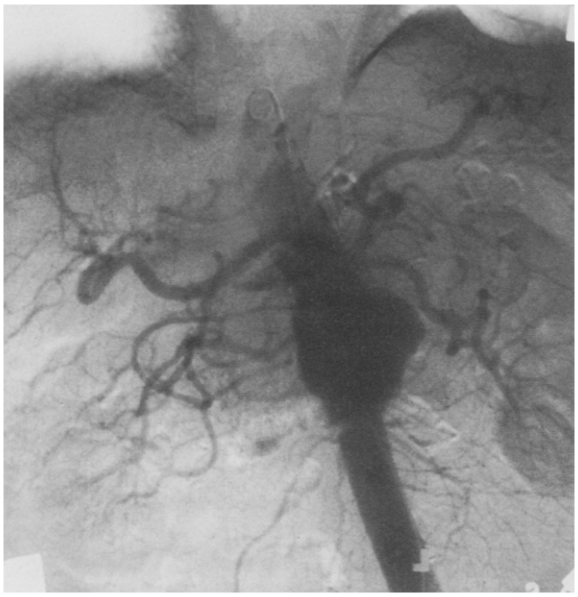

Fig. 3. Visceral arteriogram demonstrates saccular suprarenal extent of aneurysm with graft below.

perior mesenteric–left renal artery bypass and the native celiac axis were widely patent and functioning. Postoperative spinal radiographs showed no significant spinal malalignment, but external thoracolumbar splinting was recommended for long-term support and stability. The patient remains asymptomatic without evidence of recurrent infection, progressive spinal disease, or viscerorenal insufficiency to date at 6 months.

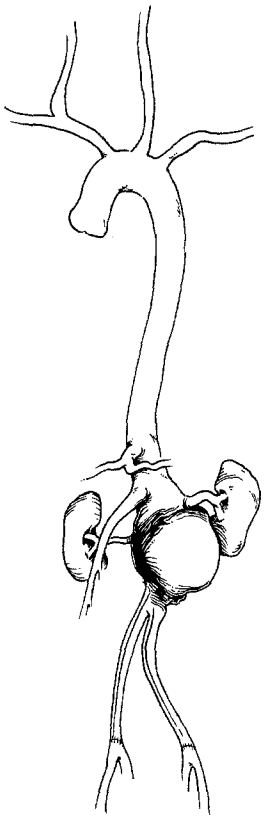

Fig. 4. Diagram demonstrates suprarenal infected pseudoaneurysm.

DISCUSSION

During the past decade, the United States has seen a reemergence of tuberculosis in epidemic proportions.[1-3] The combination of population migration from underdeveloped to developed countries and from country to city environments, increased crowding in prisons and shelters, urban homelessness, drug abuse, and HIV infection has led to the reappearance of this public health crisis.[3] Rising in parallel with pulmonary tuberculosis is the incidence of Pott's disease.[1,2] The infection typically involves the vertebral bodies of the thoracolumbar spine, with a predilection for the anterior portions of the vertebral bodies.[2] Radiographic findings describe paraspinal soft tissue involvement in a majority of patients.[4] After penetration through the anterior longitudinal ligaments, infected material will travel through natural tissue plains involving adjacent structures to include the thoracoabdominal aorta, which lies along the anterior surfaces of T4 to L4.[5] Modern series of Pott's disease note that the majority of patients have localized back pain of a relatively chronic nature that develops months after the onset of symptoms.[1,2] Neurologic symptoms are common, but not universal. Of interest, 21% to 35% of patients had no extraspinal evidence of tuberculosis, and 5% to 40% had negative tuberculin purified protein derivative skin tests.[1,2] Elderly patients typically have negative results of a tuberculin skin test as a result of a higher rate of anergy, as was the case in our patient.[6]

Pott's disease with aortic involvement is extremely rare. McHenry et al.[5] reviewed all cases of vertebral osteomyelitis associated with aortic lesions described in the world literature, including those with aneurysmal degeneration, aortitis without degeneration, and aortitis associated with acquired coarctation. Of the 69 cases reported, only 17 reports of mycobacterial spinal osteomyelitis with aortic involvement were found. Silbergleit et al.[7] in 1965 reviewed the 110 cases of tuberculous aortitis that existed in the literature at that time. The number of cases of aortitis associated with tuberculous spinal osteomyelitis was not reported. Of the 110 infections reviewed, 51 cases of aortic aneurysmal disease were noted, the majority

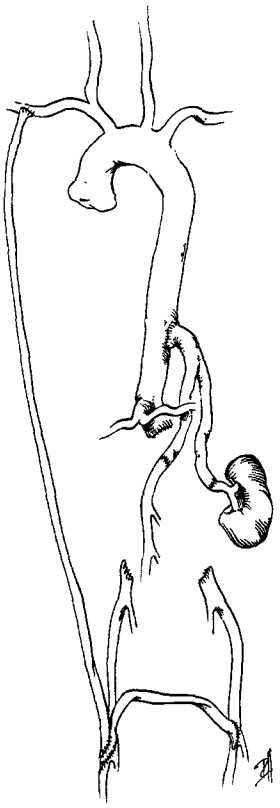

Fig. 5. Diagram shows status after definitive repair.

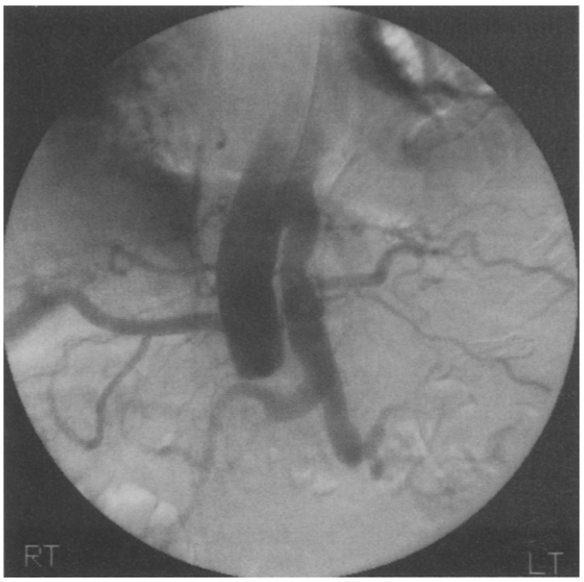

Fig. 6. Postoperative angiogram demonstrates patent, bifurcated SFPV graft arising from descending thoracic aorta to superior mesenteric artery and left renal artery.

being false aneurysms. Fifty-nine patients had aortitis without aneurysmal changes; all were found incidentally at autopsy. Thoracic aortic involvement occurred with the same frequency as abdominal aortic involvement. Mechanisms of aortic involvement include hematogenous spread to the vasa vasorum, hematogenous seeding of atherosclerotic aortic plaques and, more likely, contiguous extension from periaortic structures such as the periaortic lymphatics, empyema cavities, and the spine.[5,8-12]

Diagnosis of tuberculosis of both the spine and the aorta can be difficult. Acid-fast bacilli on appropriate stains and positive cultures alone can be elusive. Twenty-five percent to fifty percent of biopsy specimens taken in spinal tuberculosis fail to reveal mycobacterium on stains or cultures.[1,13] Twenty-five percent of the Rezai et al.[2] series of spinal tuberculosis had diagnosis based on histologic evaluation alone. McHenry and associates[5] noted that the diagnosis in the majority of reported cases of tuberculous osteomyelitis associated with aortic lesions was based on histologic findings, with an absence of positive stains or cultures. Our patient's diagnosis was made on the basis of histologic findings alone. Newer diagnostic tests, such as the use of DNA amplification techniques with polymerase chain reaction, DNA fingerprinting, and immunoassays for mycobacterial antigens, may provide a more rapid and accurate method of identifying these fastidious organisms in the future.[3,14]

The first attempt at repair of a tuberculous aortic false aneurysm was in 1949, by Herndon and colleagues.[7] The patient died of a massive gastrointestinal hemorrhage on the sixth day after surgery. Rob and Eastcott[8] are credited with the first successful excision of an abdominal aortic tuberculous aneurysm in 1955. In 1959 De Prophetis et al.[9] reported the first successful resection of a tuberculous thoracic aortic aneurysm. Unfortunately, that patient died of a ruptured abdominal aortic aneurysm 26 days after operation. Wright and associates[12] reported the first case of a tuberculous prosthetic graft infection with a proximal infected anastomotic pseudoaneurysm in an infrarenal aortic prosthesis. They treated the patient by performing an extraanatomic axillobifemoral bypass procedure and graft excision.

The complexity of our case was increased by the cephalad extent of the infection, which necessitated revascularization of the superior mesenteric artery and the left renal artery. Other authors have described various techniques of viscerorenal revascularization in cases of suprarenal mycotic aneurysms.[15-17] In situ Dacron total abdominal aortic reconstruction with visceral and renal artery prosthetic revascularization as been used for repair of suprarenal mycotic aneurysms.[15,16] Although apparently successful, recurrent

prosthetic infection is of concern. Reddy et al.[17] repaired a mycotic suprarenal aortic aneurysm by staged axillobifemoral extraanatomic bypass and excision of the posterior wall of the aorta staffing at the celiac trunk, with a posterior tapered aortoplasty ending at the orifice of the superior mesenteric artery. The left kidney then was autotransplanted to the left external iliac artery, and the right kidney was sacrificed. Six months after operation, the patient's axillofemoral bypass thrombosed, and he had acute limb ischemia and acute renal failure, presumably resulting from the lack of retrograde flow from the left external iliac artery to the left renal artery.

After extraanatomic axillobifemoral bypass, a thoracoabdominal incision was used in our patient to expose the affected suprarenal aorta. The suprarenal aorta up to the level of the celiac trunk required excision. Extraanatomic bypasses from the thoracic aorta to the left renal artery and the superior mesenteric arteries were accomplished with an antegrade SFPV graft. This approach allowed minimal warm ischemia time to the kidney and bowel while the supraceliac aorta was clamped. The data available in in situ aortic reconstructions with the deep veins of the leg in aortic graft infections suggest the durability and infection-resistance of these veins as conduits in septic operative fields.[18,19] In this particular case, the size match between the conduit and visceral/renal vessels was excellent, and with the proven durability of the descending thoracic aorta as an alternative inflow source, we believe the repair will last.

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Submitted Jan. 31, 1996; accepted May 4, 1996.